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ground of general phosphorescence which renders the eye less able to see the scintillations.

It is probable that in these phenomena we actually witness the bombardment of the screen by the positive ions hurled off by radium with a velocity of the order of that of light. Each particle is rendered apparent only by the enormous extent of lateral disturbance produced by its impact on the sensitive surface, just as individual drops of rain falling on a still pool are not seen as such, but by reason of the splash they make on impact, and the ripples and waves they produce in ever-widening circles.

Indulging in a 'scientific use of the imagination,' and pushing the hypothesis of the electronic constitution of matter to what I consider its logical limit, we may be, in fact, witnessing a spontaneous dissociation of radium—and we begin to doubt the permanent stability of matter. The chemical atom may be actually suffering a katabolic transformation; but at so slow a rate that supposing a million atoms fly off every second, it would take a century for weight to diminish by one milligram.

It must never be forgotten that theories are only useful so long as they admit of the harmonious correlation of facts into a reasonable system. Directly a fact refuses to be pigeon-holed and will not be explained on theoretic grounds, the theory must go, or it must be revised to admit the new fact. The nineteenth century saw the birth of new views of atoms, electricity and ether. Our views to-day of the constitution of matter may appear satisfactory to us, but how will it be at the close of the twentieth century? Are we not incessantly learning the lesson that our researches have only a provisional value? A hundred years hence shall we acquiesce

in the resolution of the material universe into a swarm of rushing electrons?

This fatal quality of atomic dissociation appears to be universal and operates whenever we brush a piece of glass with silk; it works in the sunshine and raindrops, and in the lightnings and flame; it prevails in the waterfall and the stormy sea, and although the whole range of human experience is all too short to afford a parallax whereby the date of the extinction of matter can be calculated, protyle, the 'formless mist,' once again may reign supreme, and the hour hand of eternity will have completed one revolution.

WILLIAM CROOKES.

SCIENTIFIC BOOKS.

Index Animalium, sive index nominum quæ ab A. D. MDCCLVIII, generibus et speciebus animalium imposita sunt. By C. DAVIES SHERBORN. Part I., January, 1758, to December, 1800. Cambridge (England), University Press. (New York, Macmillan Co.) 1902. 8vo. Pp. lix + 1195.

All zoologists have been aware of the stupendous undertaking upon which Mr. Sherborn has been at work for the last twelve years, except for an interval during which his health was so impaired as to necessitate a temporary interruption.

The aim of the undertaking was 'to provide zoologists with a list of all the generic and specific names which have been applied by authors to animals since January 1, 1758,' together with an exact date for each page cited, and a reference 'sufficiently exact to be intelligible alike to the specialist and to the layman.' Special groups of animals have been so treated before, but this is the first work planned to include the entire animal kingdom in its scope.

Work was begun in July, 1890; in 1892 the British Association extended its support, and two years later appointed a committee to watch and advise the undertaking. Financial support has also been extended by the Royal Society and the Zoological Society of London.

In 1897, at the suggestion of Dr. Sclater, in view of the long period which must elapse before the completion of the whole manuscript, it was decided to publish that portion relating to the zoological literature of the eighteenth century, and this material drawn from some 1,300 volumes is comprised in the book now under review. When it is considered how rare many of the printed sources are, it must be considered fortunate that less than twenty titles comprise those which are still 'Libri desiderati.' Mr. Sherborn has been indefatigable in searching out obscure dates, the dates of works issued in parts, etc., and his contributions to our knowledge of the chronology of zoological literature will be gratefully appreciated by students.

There are one or two features of the scheme to which exception will undoubtedly be taken by many zoologists, such as the denial of standing to excerpts and authors' separates, which often appear years before the volume of transactions to which they belong is offered in its entirety to the public; also, the treatment of named figures as *nomina nuda*, if issued before or without a text explaining or describing them. However, if the facts and dates are fully included in the body of the bibliography, as we suppose to be the case, individual judgment can be exercised without reference to the views of the committee or compiler.

The list of works consulted covers forty-nine pages and is a most important part of the work, and we would strongly urge that in future instalments an even fuller and more explicit description of each be included, especially with regard to its relation to binomial nomenclature. What the student working out the nomenclature of a group needs is an exact statement of the facts. There will always be differences of opinion as to the use of these facts in some cases, but the judgment finally should be that of the student, and his opportunity to utilize the facts should not in any way be restricted by the views of those engaged in preparing or supervising the compilation.

Many of the works which are essential to

the determination of questions of priority belong to the transition period when the Linnean system was not generally accepted and was frequently not even understood, so that it is of the first importance to the synonymist to know whether the author of such a work accepted the Linnean nomenclature or not, and, if he did not consistently accept it, the fact should be plainly stated. To cite an instance bearing on the question, a work by Moehring, 'Geschlachten d. Vogelen,' was printed in 1758. A friend, who, at my request, has consulted the only copy known to me in America, informs me that there are in the book no genera in the Linnean sense, no specific names in the modern sense whatever, only vernacular names; and the latest Linnean citation in the book is from the sixth (non-binomial) edition of Linnæus's 'Systema Naturæ.' The 'genera' of Moehring, therefore, are, like the 'genera' of Tournefort and other pre-Linnean authors, not entitled to be cited in systematic nomenclature. Yet of this in neither bibliography nor text of Mr. Sherborn do we find any intimation that Moehring's 'genera' are not regularly binomial.

Again, in the Museum Geversianum an extremely rare book with an important bearing on molluscan nomenclature, we find the majority of the animals cited under Linnean names, but the mollusks classified by a new method invented by Meuschen, all the 'generic' names being in the plural, many of them composed of two separated words.

'Genus 51' is 'Umbilici marini formes'; 'Genus 58' is 'Disci transfixi,' and so on. The former name does not appear in Mr. Sherborn's list at all, the second appears in the modified form of 'Disci-transfixus.' *Hippopodes* Meuschen, appears in Sherborn as *Hippopus*, without explanation, and the great majority of Meuschen's names are changed into forms which do not occur printed in his book at all. In his bibliography Mr. Sherborn states that "Meuschen's trinomials are his binomials plus 'forma' = 'varietas,' and are precisely similar to the trinomials used by mammalogists in the present day." I am not a 'mammalogist,' but I do not remember

ever seeing any mammalian generic names of the present day composed of three words or in the plural number. It is of course perfectly open to any one to accept Meuschen's polynomial plurals as 'genera,' if it seems good to them; the point here made is that a perfectly satisfactory bibliography should state the exact facts and leave the reader to apply them according to his own judgment.

Appreciating the immense and self-sacrificing labor devoted to this work by Mr. Sherborn and the committee, and the very great value to all working zoologists of the result; while feeling that any criticism must seem ungracious, we nevertheless believe that it is a matter of duty to insist on the importance of greater fulness in description and exactitude in citation of works in regard to which any doubt can exist. Otherwise an uncertainty which would be deplorable must rest on the published results, of such importance to every zoologist.

WM. H. DALL.

A Manual of Bacteriology. By ROBERT MUIR, M.A., M.D., F.R.C.P. (Edinburgh), Professor of Pathology, University of Glasgow, and JAMES RITCHIE, M.A., M.D., B.Sc., Reader in Pathology, University of Oxford. American edition (with additions), revised and edited from the third English edition by NORMAN MACLEOD HARRIS, M.B. (Toronto), Associate in Bacteriology, the Johns Hopkins University at Baltimore. New York, The Macmillan Company. 1903. 170 illustrations.

Every student of bacteriology is familiar with this excellent work of Muir and Ritchie, which must be regarded as one of the most comprehensive and most useful writings upon the subject, and every American student of bacteriology will welcome Dr. Harris's edition. In the preface of the American edition, Dr. Harris assures us that an endeavor has been made to add to the value of the book by giving practical expression of the best American laboratory methods and research, and at the same time to augment the general scope of the work without eliminating the personal impress of the author. Therefore, occasional alterations and additions of greater or lesser mag-

nitude have been made throughout the book in general, but more especially in the chapters upon 'Methods of Cultivation of Bacteria,' 'Microscopic Methods—General Bacteriological Diagnosis—Inoculation of Animals,' 'Bacteria of the Air, Soil and Water—Antiseptics,' 'Typhoid Fever—Bacilli Allied to the Typhoid Bacillus' and 'Tetanus.'

Dr. Harris has so successfully introduced the added matter that it is practically impossible to differentiate his insertions from the original text, and we are pleased to observe that the original general arrangement and treatment of subjects has not been departed from. We are impressed with the care exercised by Dr. Harris in introducing new matter and bringing the book up to date, as well as by his selection of the important contributions of American writers to be introduced. We find the chapter upon 'The Methods of Cultivation of Bacteria' containing sufficient references to the work of Mr. Fuller upon 'The Standardization of Media' and the recommendations of the laboratory committee of the American Public Health Association upon the same subject. We also note with pleasure a description of Hill's 'Hanging Block Cultures,' by which the growth of bacteria upon solid media can be observed under the microscope. Stuart's 'Cover Glass Forceps' appear in the chapter upon 'Microscopic Methods.' Pitfield's method of staining flagella is considered with care. The chapter upon 'The Relation of Bacteria to Disease' has lost none of its excellency, though this chapter has always been of such a superior quality that it would be hard to find any way to improve it. Throughout the special part of the work we notice that matters of recent controversial interest are carefully, though not dogmatically, treated. The various toxic products of bacteria are mentioned in brief, commonly with the conclusion that very little is known about them, so that the student is not led astray. Likewise the importance of antitoxins and antisera in those diseases in which their virtue is not proved, are but briefly dwelt upon. Koch's suggestion that the bovine tubercle bacillus does not infect man is discussed and Theobald Smith's pre-